



Figure 1. Imperfect albino Red-tailed Hawk perched near nest tree in Benton County, Oregon.

SURVIVAL OF THE SMALLEST NESTLING IN GOSHAWKS

by
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Abstract

A nest containing four Goshawk chicks was observed during the 1979 breeding season. One young was smaller than its siblings throughout most of the nestling period. It called more during feedings and received less food. The adult female varied in her response to the small bird as the season progressed. She ignored calls early in the season, yet the young hawk was fed in the nest after all other chicks had flown. Possible reasons for this contradiction in adult behavior and its relation to food supply are discussed.

Introduction

Asynchronous hatching can be regarded as an adaptation to an unpredictable food supply, enabling all young to survive in times of plenty, but ensuring rapid reduction of the brood to an appropriate level in times of scarcity (Newton 1978a). This paper documents the survival of a young Goshawk (*Accipiter gentilis*) despite a 1-3 day age difference at hatching among the four chicks and an 18-day difference in dates of leaving the nest from first to last young. Lack (1968) stated that it is probably important for young

birds all to leave the nest at the same time if continued feeding by the parents occurs. Apparently young Goshawks can be fed despite leaving the nest at different times.

Study Area

Data on breeding behavior of Goshawks were collected from 6 March–1 August 1979 on an 800 ha area, 24 km north of Provo, Utah. Elevation ranges from 1991 to 2195 m. Approximately 80 percent of the area is forested, predominately aspen (*Populus tremuloides*) with some mixed forest including white fir (*Abies concolor*) and Rocky Mountain Douglas fir (*Pseudotsuga menziesii*). Observations were made from a tree blind 27.4 m west of the nest that was located in an aspen 9 m from the ground and were made in the course of the breeding study.

Results and Discussion

Four young hatched by 8 June with a 1–3 day age spread among them. By 16 June one was estimated to be half the length of the other nestlings. It begged for food intermittently as the others slept. At each feeding the larger chicks pulled food from the mouth of the hen as soon as it was presented. If food was not taken immediately from her beak, the female fed herself.

Newton (1978b) stated that one factor in assuring an even growth rate among Sparrowhawk (*Accipiter nisus*) nestlings is the sharing of prey by the female until a late stage in nestling growth. The female Goshawk made no attempt to feed the smallest chick selectively although the young bird continued to call when all other young were silent after feeding. Newton (1976) suggested that a single young may present to the hen an insufficient stimulus for feeding. Although the brood consisted of four chicks, the smallest was the only one that called at the end of a meal. The calls apparently were not sufficient to induce the hen to continue feeding the young. At the end of each meal the small chick had a partially filled crop compared to the full crops of its siblings. It obtained much of its food by taking it from the beak of a larger nestmate.

Lack of food partitioning led to the death of several nestling Marsh Hawks (*Circus cyaneus*) (Breckenridge 1935). Newton (1976) and Mebs (1964) found that a cannibalism or death of the smallest chick was a consequence of underfeeding in Sparrowhawks and the Common Buzzard (*Buteo buteo*), respectively. Ingram (1959) cites fratricide often followed by cannibalism in Goshawks. During the current study, an attack by a larger nestmate was observed on only one occasion in the second week after hatching.

The smallest chick was less than half the size of it nestmates by 27 June when I banded them and still had no pinfeathers while the others were beginning to lose down. One chick had left the nest by 13 July, and two were found sitting on branches adjacent to the nest. Only the smallest chick remained in the nest on 26 July. Feathers had grown, and down was visible only on the legs and abdomen and under the wings. The bird had moved to the branches on 31 July and flew first on 1 August. The adults had continued to feed it in the nest while also feeding chicks that had already flown from the nest.

The parents would gain inclusive fitness by retaining or even becoming more sensitive to care-soliciting behavior in young birds nearly ready to fly. The adults had a greater investment in terms of time, care, and energy in their young late in the nestling stage. Had the smallest chick died soon after hatching, the loss would not have been as great. Since the adults had expended energy and time to raise the young hawk to four weeks, the advantage was to respond to calls of the smallest chick rather than to allow it to die.

One additional offspring in the population would increase the genetic potential of the adult Goshawks.

Prey were abundant in the 1979 nesting season. Food items included the Uinta ground squirrel (*Spermophilus armatus*), Steller's Jay (*Cyanocitta stelleri*), and Common Flicker (*Colaptes auratus*). Small mammal density was estimated by the recapture method (Smith et al. 1972, Scott et al. 1978), and was 165 animals per hectare in the meadows surrounding the nest woodlot. If food had been in short supply, there would have been no fitness gained by raising four undernourished young that would never survive to reproduce. At the other extreme, there would have been considerable waste of parental investment by having neglected a chick that could have been adequately fed.

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ANNOUNCEMENT

SPECIAL ISSUE OF RAPTOR RESEARCH DEVOTED TO GOLDEN EAGLES

The Raptor Research Foundation, Inc., will devote the spring issue, 1982, of *Raptor Research* to publishing significant new research on golden eagles. Full length manuscripts as well as shorter communications are being actively solicited. The deadline for manuscripts is 1 July 1981. For further information please contact Richard L. Knight, Washington Eagle Study, Washington Department of Game, 600 N. Capitol Way, Olympia, WA 98504.



Figure 1. One-month-old Goshawk chicks. The adult female is in the background.

FEEDING ECOLOGY OF THE SPOTTED OWL IN CALIFORNIA

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Abstract

The Spotted Owl (*Strix occidentalis*) from the Coast Range of northern California and the Peninsular Range of southern California preys heavily on forest-dwelling mammals, especially the dusky-footed woodrat (*Neotoma fuscipes*). Meadows are not regularly hunted by these owls, despite large numbers of prey there. Indexes of prey biomass diversity indicate a relatively narrow prey base for the Spotted Owl in California. The Screech Owl (*Otus asio*) is an uncommon but regular prey item of the Spotted Owl; mobbing by Screech Owls in response to imitated Spotted Owl calls is described.

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